

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

TO: Distribution

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THRU:

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FROM: Bert R. Dennis *BRD*

SYMBOL: G-3-81-249

SUBJECT: BRIEF HISTORY OF HDR FENTON HILL DRILLING

Although many difficult drilling problems were encountered throughout the Fenton Hill HDR Project, persistence, fortitude, and hard work (not to mention lots of bucks) have provided the means for the successful completion of all Fenton Hill geothermal wells in a very high-risk environment. The companion hydraulic fracturing operations and energy extraction experiments have also been achieved solving additional technical programmatic goals under equally adverse conditions (subject of future summary). A summary of drilling operations at Fenton Hill follows.

	<u>GT-1</u>	<u>GT-2</u>	<u>EE-1</u>	<u>*GT-2 A/B</u>	<u>EE-2</u>	<u>EE-3</u>
Spud Date	May 72	Feb 74	May 75	April 77	April 79	May 80
Completion Date	June 72	Oct 74	Oct 75	July 77	May 80	Aug 81
Total Depth (Ft)	2576	9619	10,053	1677	15,289	13,933
Bottom-Hole Temp (°C)	101	197	205	186	317	N/A
Est Cost (\$K)	145	1900	2300	N/A	7300	11,500
Drilling Supervisor	D. Brown	D. Brown	D. Brown	E. Williams	E. Williams	E. Williams (0-10,000) J. Rowley (10,001-13,933)

*Total for GT-2A and GT-2B combined.

The total combined drilled depth at Fenton Hill is 53,147 ft.

Notes:

- GT-1 -- First hot dry rock test well drilled into the granite formation with the first successful hydraulic-induced vertical fracture (they said it could not be done).
- GT-2 -- First large vertical hydraulic fracture induced at depth in the granite basement rock under high-temperature conditions.
- EE-1 -- First directionally drilled wellbore in the granite formation at high-temperature conditions to intersect hydraulic-induced fracture. First successful connection to the man-made geothermal reservoir.
- GT-2A/B -- First successful sidetracked hole in the granite formation and at high-temperature conditions. GT-2A was sidetracked at a depth of 8144 ft and drilled to 9184 ft. GT-2B was sidetracked at 8270 ft and drilled to 8907 ft. First low impedance to flow intersection that allowed first hot dry rock energy extraction demonstration.
- EE-2 -- First very deep well drilled in granite at high temperatures using directional drilling techniques to achieve a high-angled borehole (35° from vertical).
- EE-3 -- Drilled under controlled direction to position this wellbore directly over the EE-2 wellbore. The EE-3 borehole was sidetracked at 9471 ft to bypass stuck drilling assembly and completed to depth of 13,933 ft.

Total depth of drilling at Fenton Hill in the granite basement rock was about 42,547 ft. How about that!

BRD/jm

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